HP LeftHand SAN Solutions

Support Document

Application Note

Microsoft Exchange Server and SAN/iQ Volumes

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Microsoft Exchange Server and SAN/iQ Volumes

Unbounded growth and high availability of messaging systems are two of the toughest challenges currently facing IT managers. The power and flexibility of LeftHand Networks' storage solutions enable the Microsoft® Exchange administrator to dynamically address the growing challenges associated with managing a Microsoft Exchange environment.

Designing a Microsoft Exchange environment requires significant study and planning, ranging from Microsoft Active Directory service design to disk group configurations. When planning the storage strategy for Exchange, administrators typically should consider four criteria:

- Capacity
- Availability
- Performance
- Recovery

These factors affect the cost, architecture, maintenance, and disaster recovery of an Exchange environment. This paper presents some example configurations and outlines some basic best practice considerations.

Microsoft Exchange Architecture

With Exchange 2000 and beyond, Microsoft introduced the concept of Storage Groups and Mailbox Stores. A storage group is similar to an individual Exchange Server. Each exchange server can contain up to four storage groups, and a storage group can contain five mailbox stores. Separate log files are stored for each storage group. Each mailbox store contains two databases, the mailbox store (.edb) and the streaming media store (.stm). The actual user data resides in these files. If a problem occurs, an administrator can take the mailbox stores offline in the storage group having the problem, without affecting the users in the other storage groups.

When set up correctly, Exchange storage groups can be a powerful tool to make backup and recovery options much less painful. When combined with snapshot, SAN/iQ Remote Snapshot, and the flexibility of the SAN/iQ software from LeftHand Networks, it can reduce backup and recovery from hours to minutes.

Best Practice:

- *Place high profile Exchange users in a separate storage group and mailbox store. This will greatly reduce maintenance and the likelihood of problems.*
- *Place each Storage Group's information on a separate volume. To fully leverage the functionality of the SAN/iQ solution, create a snapshot schedule (see below).*
- *Place all mailbox stores associated with a storage group on a single volume separate from the associated logs. To fully leverage the functionality of the SAN/iQ solution, create a snapshot schedule (see below).*

Configuring SAN/iQ Volumes

When possible, Exchange volumes should be created with two-way replication. In single NSM environments data must be protected by either RAID 5 or RAID 10. These configurations provide a base level of data security.

In our example, illustrated in Figure 1, we have established a Management Group called "Corporate" and a cluster called "Mail." To align the I/O patterns of the Exchange databases, separate volumes were created to hold the mailbox stores – mst1 and mst2 – and storage group log files – log1 and log2. The initial size of the volumes is not critical as they can be easily expanded as needed.

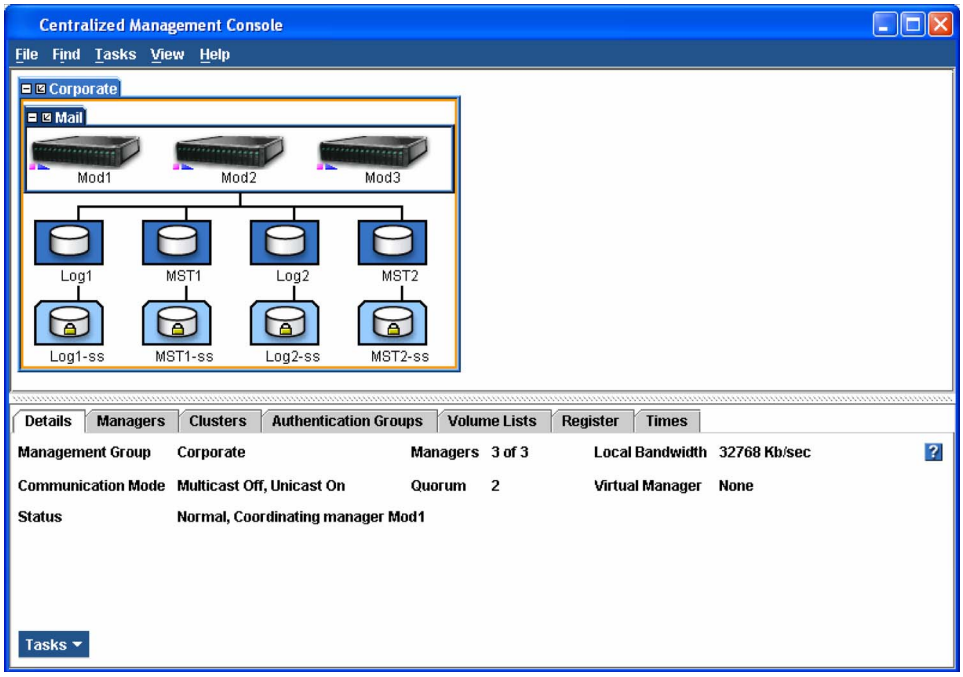


Figure 1: Example of a basic Exchange configuration

Next assign volume lists and authentication groups, and connect the volumes to the Exchange server using the steps identified in the user manual. Format the volumes and assign drive letters.

Best Practice:

- *Align disk partitions to 64K using the diskpar or diskpart utility. For detailed instructions refer to the support note – Setting Windows Disk Partition Offset for Best Performance.*
- *Format the volumes as basic disks with a 4096b allocation unit. With the SAN/iQ solution and the capability to expand basic disks, dynamic disks are not recommended. For more information on disks and expanding basic disks, see the Support Note: Choosing Basic or Dynamic Disk for SAN/iQ Volumes.*
- *Use two-way replication when possible. This ensures that there are always two copies of your data in the storage pool, providing high availability beyond the internal NSM redundancy.*

Exchange Configuration

The next step is to set up the Exchange server and create the Mailbox Stores. In our example, we created a Storage Group and Mailbox Store for 'Executives', and another Storage Group and Mailbox Store for 'Employees'. See Figure 2.

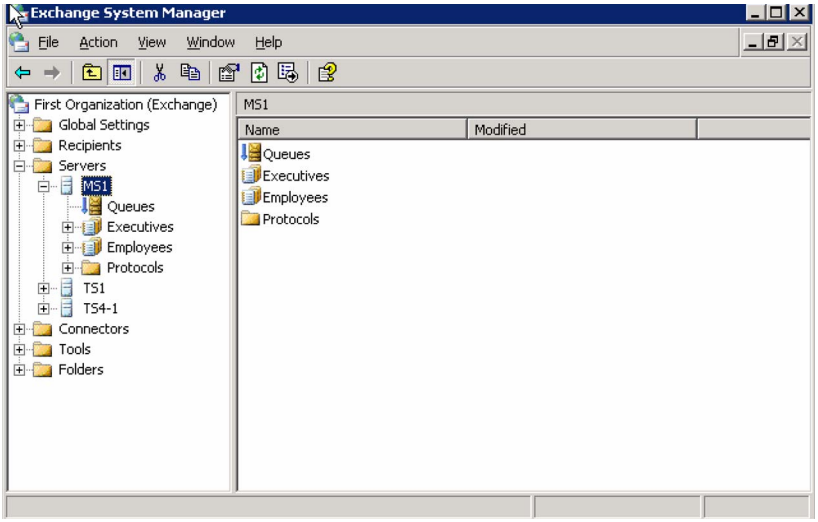
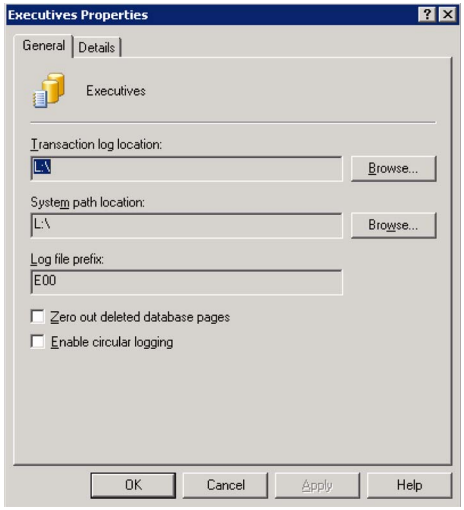


Figure 2: Example of basic Exchange 2003 Mailbox configuration

When creating a new Storage Group, the properties screen will require a new name, transaction log location, and system path location. See Figure 3. First type in the name of the storage group, then browse to the SAN/iQ volume created to host the log files and place both the transaction logs and system path in this new volume. This will create the new storage group and place the logs on the SAN/iQ volume.



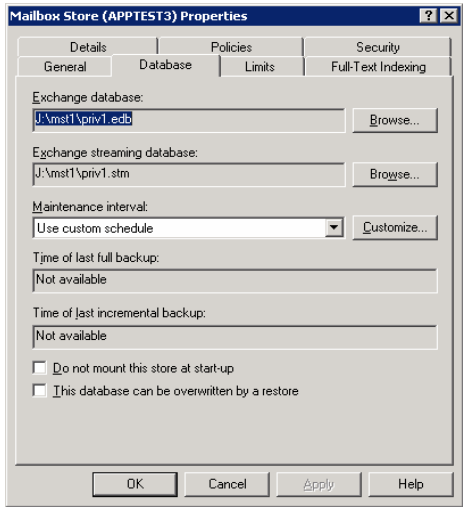


Figure 3: Storage Group properties screen Figure 4: Mailbox Store properties screen

When creating a new Mailbox Store, the properties screen will first require a name for the mailbox. Then, under the database tab, the mailbox database location will default to the same drive as its parent Storage Group. Change the database location by selecting the browse button and navigating to the SAN/iQ volume and directory created for this mailbox store. See Figure 4. Both the .edb and .stm databases should be in the same location.

If you are moving an existing Storage Group or Mailbox Store, the same basic procedures apply. When you specify a new location from the properties boxes, Exchange will automatically move the data. Depending on the number and size of those files, this operation could take several minutes.

Note: *When moving an existing Storage Group or Mailbox Store, the mailbox stores associated with that group will be dismounted during the move and users assigned to those mailbox stores will not have access to Exchange.*

The setup is complete after each Storage Group and Mailbox Store has been created or moved to the appropriate SAN/iQ volume.

Best Practice:

- *Spread out your Exchange users into multiple Storage Groups by function or hierarchy. Storage Groups can contain five Mailbox Stores. If a problem occurs, only the storage group and associated mailbox stores must be brought off-line; the rest of the Exchange users can remain operational.*
- *Do not move existing databases during work hours. If possible, perform this operation over a weekend.*

Network Configuration

To increase performance and keep data traffic separate, we suggest that you create separate subnets for both public and storage network traffic. Figure 5 illustrates this network environment. This configuration maximizes network bandwidth for both user and storage communication requirements.

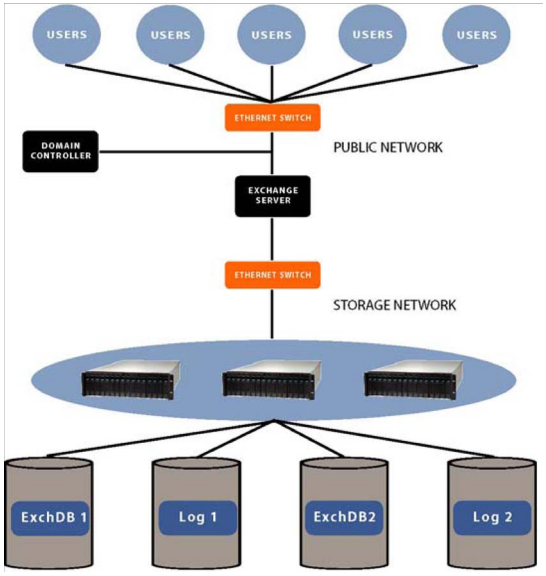


Figure 5: Example of subnets for the public and storage networks.

Best Practice:

- *Configure the storage network with a gigabit network card in the Exchange Server. Attach the server to a gigabit switch and hook up all the storage modules to the same switch through each of their gigabit ports.*

Configuring SAN/iQ Snapshots

Properly configured snapshots can greatly enhance the availability of any Exchange environment. Snapshots are read-only, point-in-time copies of a SAN/iQ volume. A snapshot can be "rolled back" to a previous point in time. The capability to roll back to a previous state gives administrators the flexibility to roll back to a known "good" state.

In the case of Exchange, snapshots give administrators the power to quickly recover an Exchange server to a previous state. Since Exchange maintains log files of every transaction, it's possible to roll back a database volume, replay the log files back into the database, and recover all messages up to the point where the mailbox store was taken off line because of the problem.

In our example setup, the log files and database files were placed on separate volumes. This enables you to roll back the database and recover from the log file volume that remains intact. For example, if you've created a daily snapshot schedule to take place every morning at 6am and your Exchange server gets hit with a virus at 10am, you could roll back the volumes that contained the databases to the 6am snapshot, load the latest anti-virus definition files on the Exchange server, and replay the log files through the new anti-virus definition files to re-capture all the Exchange messages that happened between 6am and 10am.

VSS snapshot integration with Exchange

To create a "good" snapshot with Exchange volumes, the application must be temporarily turned off or the snapshot must be taken using the VSS provider available from LeftHand Networks. Using the VSS framework to take snapshots of Exchange databases ensures consistency of the data. A VSS requestor is required to schedule and initiate snapshots. Your current software backup solution might already be a qualified VSS requestor. Check with your vendor for availability of VSS support.

Snapshots without VSS

If VSS or dismounting databases are not a practical solutions for your environment snapshots can still be useful if configured correctly. For a non VSS snapshot to be successful the log volume and data volume must be snapshot at the same time. To accomplish this make sure all of your NSMs have the exact same time and time zone. This can be easily accomplished by configuring your NSMs to use your Windows domain controller as a NTP server. Then configure a snapshot schedule for both the log volume and database volume to occur at the same time. When the snapshots are taken at the same time Exchange should be able to successfully recover those databases if both volumes are rolled back to the same point in time. It is possible however that the database will not automatically become consistent when mounted. If this occurs the data can still be recovered using the eseutil tool provided with Exchange.

Best Practice:

- *Use the VSS framework for taking snapshots with Exchange databases online.*
- *Place log files and database file on separate SAN/iQ volumes. This provides the most flexibility for recovery - database files can be rolled back and log files replayed to bring the database back to the state it was before the rollback occurred.*
- *Create a snapshot scripting schedule for each volume. See the SAN/iQ Users Manual for more information on creating snapshots and snapshot scripting.*

Optimizing Backup and Recovery

Careful planning is important to ensure enough time to back up an entire Exchange server. Exchange 2000 and 2003 can be backed up using multiple streams but require that your users be spread across multiple storage groups. To improve backup performance, a SAN/iQ volume can be used as a backup target, eliminating the need for tape archiving, tracking, and purchasing. Diskbased backup can also greatly enhance restore performance.

Best Practice:

- *Use a combination of daily snapshots – for backup and rapid restore - and weekly online backups – for log file maintenance -- to ensure the highest level of data protection and recovery.*
- *Backup to a separate set of storage modules to eliminate the risk of media failure.*

Summarizing the Advantages of an IP SAN Solution

Simple Scalability

Keeping up with the ever-increasing need for storage space is one of the significant challenges in maintaining a Microsoft Exchange environment. With a DAS solution, the storage is internal to the Exchange server and upgrading requires the administrator to either purchase another server or exchange the disk in the current server. This can be a lengthy and tedious task that can consume an entire weekend and keep services offline. With an IP SAN from LeftHand Networks, adding capacity is as simple as adding another storage module to the network. There's no downtime, and the administrator can grow the Exchange store during business hours without impacting users. The administrator can also grow a given volume on the fly by assigning additional capacity from the storage pool to that volume. Likewise, unused capacity can be reassigned from a less utilized volume, eliminating wasted storage capacity and allowing administrators to scale storage independently of the Exchange servers.

Solving the Backup Problem

An IP SAN from LeftHand Networks also provides sophisticated, yet simple, backup scenarios for Microsoft Exchange. The IP SAN can be used as a backup target, significantly increasing the speed of the backup and eliminating the need for tape archiving, tracking, and purchasing. The IP SAN also supports snapshot, or point-in-time copies, of volumes to ensure instantaneous backups. Data can be backed up to tape or other medium from the snapshot volume, as opposed to doing the backup from the original copy of the data. Snapshots eliminate the backup window, remove backup traffic from the corporate LAN, and offload backup processing from application servers.

High Availability

High availability is another important concern for Exchange administrators. With an IP SAN, the admin can choose a replication level, either two-way or three-way, for each data volume. If the database information in the Management mailbox is deemed critical enough to increase the replication level to three, meaning there will be three copies of the data spread across the NSMs, the administrator can easily set that volume's replication level using a simple pull-down menu. There's no downtime to adjust replication levels.

Support for a hot spare is another aspect of high availability with a LeftHand Networks IP SAN. If an active NSM in the cluster were to fail, the hot spare module would automatically take the place of the disabled module. Data re-striping is immediately started to the new module. Administrators can set monitoring levels to be notified if a failure occurs, but no administrator intervention is required to activate the hot spare.

Disaster Recovery for Microsoft Exchange

LeftHand Networks allows administrators to maintain a full copy of their Exchange storage in a second location. For locations linked by sufficient bandwidth, synchronous replication is supported. In a disaster scenario, the data copy in the secondary location will be the same as that in the production location.

For locations with bandwidth-limited links, a snapshot of volumes in the production facility can be used to update the secondary locations. In a disaster scenario, the data copy in the secondary location will be a point-in-time copy of the production data. The amount of data lost is minimized as the snapshot/copy frequency increases, limited only by bandwidth constraints.

Additional References

- *Microsoft Exchange Server Home Page* – stay up on the latest information on Exchange, track security issues and downloads fixes. **http://www.microsoft.com/exchange/**
- *Reviewing Storage Limits* – describes the difference between basic and dynamic disks, highlights limitations, and provides more detail on extending volumes.
  http://technet.microsoft.com/en-us/library/cc773268.aspx

- *How to Use Diskpart.exe to Extend a Data Volume* – describes how to use the Diskpart.exe commandline utility to extend a data volume into unallocated space. **http://support.microsoft.com/default.aspx?scid=kb;EN-US;325590**
- *SAN/iQ Remote Copy in an Exchange Environment* – support note which describes the process to deploy and implement remote copy in an exchange environment. Available **http://www.hp.com**
- *Best Practices for Enabling Microsoft Windows with SAN/iQ* – support note which describes the process to set the disk offset of a Windows partition. Available **http://www.hp.com**

The information in this article applies to:

- SAN/iQ versions 5.0/5.1/6.1/6.3
- Microsoft Windows 2000 Server
- Microsoft Windows 2000 Advanced Server
- Microsoft Windows Server 2003
- Exchange Server 2000/2003 Standard and Enterprise